Chapter

The Problem of the Colorectal Anastomosis

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Abstract

Colorectal anastomosis is defined as a surgical procedure in which the colon is attached to the remainder of the rectum after most or some part of it was removed during an intervention. A straight colorectal anastomosis implies a direct attachment, while a J-pouch colorectal anastomosis implies a previous creation of a reservoir, or "pouch" out of bowel material. The problem of colorectal anastomosis safety and outcome is among the most important and persistent issues in colorectal surgery, mainly due to the anastomotic leakage, a threatening and dangerous complication, with an incidence of up to 20% or even more in case of surgical oncology. Various prediction models and anastomosis testing techniques have been described in order to prevent or identify early any possible imperfection of the anastomosis, each with pros and cons. The measures generally used to increase the safety and reliability of the colorectal anastomosis are to evaluate the blood supply of the tissues anastomosed with indocyanine green, or to test the mechanical integrity of the anastomosis for leakage by employing air, methylene blue, or tension.

Keywords: colonic fistula, anastomotic leakage, colorectal anastomosis, colorectal surgery complications

1. Introduction

An anastomosis is a surgical connection between two structures. It usually means a connection that is created between tubular structures, such as blood vessels or loops of the intestine. Surgeons can choose to join together the two parts of the intestine by using either sewing (sutures) or staples. Sewing by hand has been used successfully for over 100 years. However, stapling takes less time to perform. As with any intervention, anastomosis carries some risks. These include blood clots, bleeding, scarring, blockage, stricture, or abnormal narrowing, damage to the surrounding structures, and infections, all of which can lead to anastomotic leakage, sepsis, septic shock, or even death (**Figures 1** and **2**).

2. General aspects of bowel anastomoses and modern variations that impacted the outcome

Barbed sutures are available in a variety of both absorbable and nonabsorbable monofilament materials. Specifically, currently available bidirectional and unidirectional barbed suture materials include PDO, polyglyconate, poliglecaprone 25, glycomer 631, nylon, and polypropylene. A study performed by Wiggins [1]

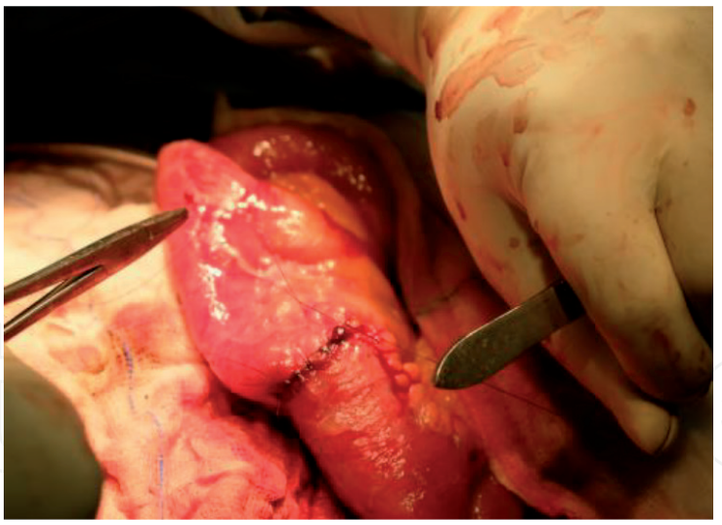

Figure 1.
Intraoperative aspect of an anastomosis performed manually at the level of the small bowel.

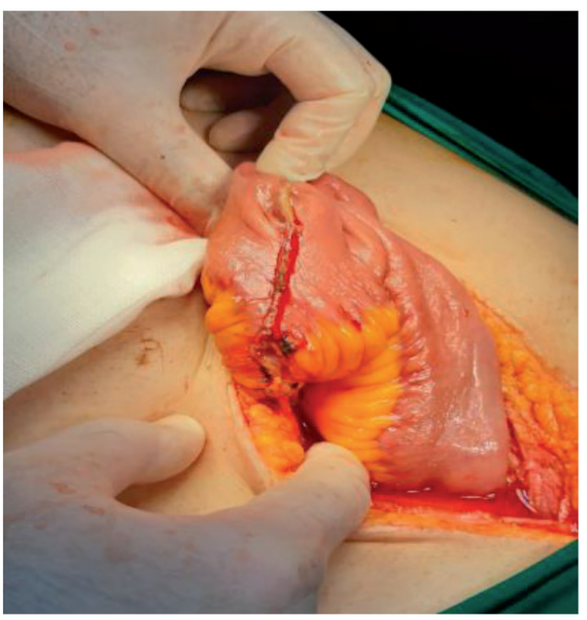

Figure 2.
Intraoperative aspect of an anastomosis performed mechanically at the level of the small bowel.

searched through a systematic review and meta-analysis for the benefits of barbed suture utilization in gastrointestinal anastomosis. The conclusion was that the use of barbed sutures for gastrointestinal anastomosis appears to be associated with shorter overall operative times. There was no difference in rates of complications (including anastomotic leak, bleeding, or stricture) compared with standard suture materials.

The study included consecutive CD patients with ileal/ileocolonic strictures who had SWE shear wave elastography within one week of surgical resection.

The SWE of the stenotic bowel wall was compared to the biofragmentable anastomosis ring used for gastrointestinal anastomoses in a literature review conducted by Bobkiewicz and coauthors [2].

The theoretical idea was that a biofragmentable anastomosis ring (BAR) could be used instead of manual and stapled anastomoses in the upper and lower GI tracts.

The aim of this study was to see how effective BAR was for bowel anastomoses using our own content. Methodologies: Between 2004 and 2014, a retrospective study was conducted on a total of 203 patients who underwent bowel surgery with

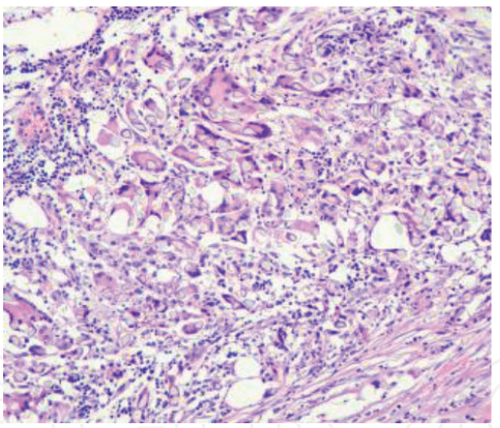

Figure 3.
Foreign body reaction at the level of the tissues containing suture material.

Figure 4.
Colorful surgical nylon monofilament suture with a curved needle.

BAR anastomosis in the upper and lower gastrointestinal tract. The study concluded that using BAR for GI tract anastomoses is an easy and quick procedure with a low rate of perioperative mortality (0.5%) and complication rates (**Figures 3** and **4**).

3. Colorectal anastomosis: General facts and variations of the techniques used

3.1 Manual versus mechanic

The ideal stapling device should be capable of rapid creation of an anastomosis with serosal apposition without the persistence of a foreign body or a foreign body reaction, which potentially contributes to early anastomotic dehiscence or late anastomotic stricture (**Figures 5** and **6**).

3.2 Debating issues of the mechanical colorectal anastomosis

While 2-row stapling has become normal in low anterior resections (LARs), it has no effect on morbidity or the incidence of AL.

Conducted by Nekliudov [3] is the first prospective, randomized clinical trial that compares the success rate of modern 3-row circular staplers to that of traditional 2-row staplers.

According to the hypothesis, the frequency of AL in the 3-row stapler group is not significantly higher than in the 2-row stapler group.

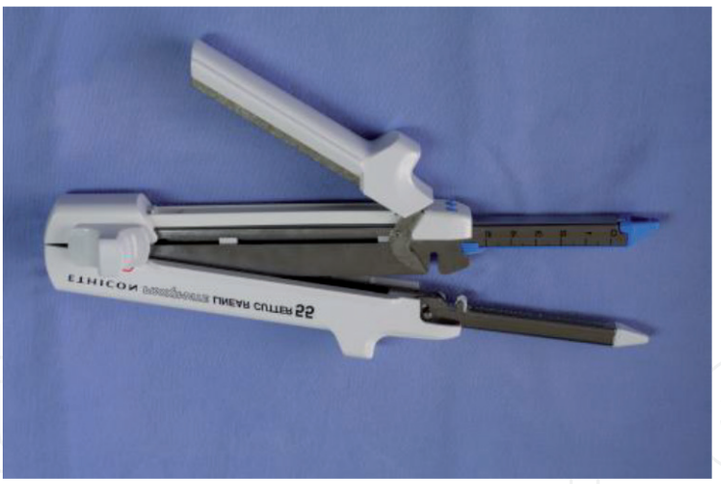

Figure 5.
Linear surgical stapler.

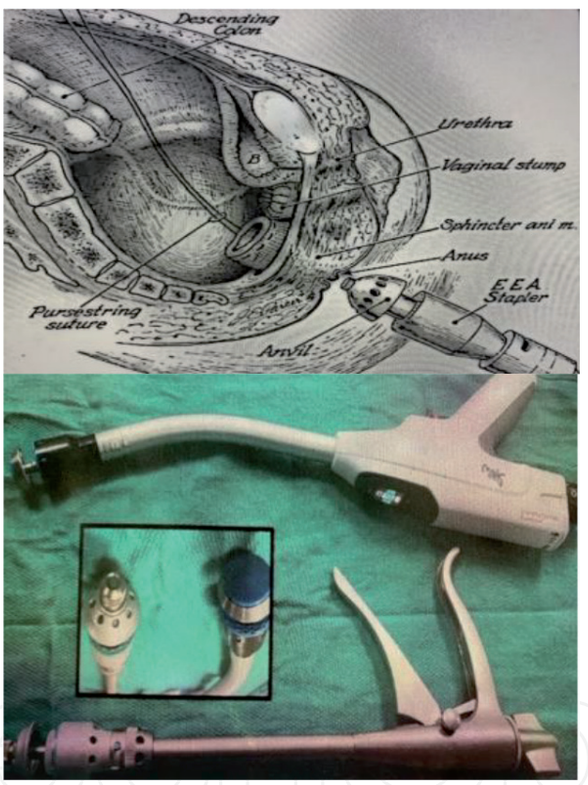

Figure 6.
(a and b) circular stapling device and its mode of appliance.

The rate of AL, as determined by imaging studies and measured using the Pearson chi-squared test and Fisher exact test, is the primary endpoint.

Secondary outcomes include AL severity (A, B, or C), anastomotic bleeding, postoperative complication rate (graded using the Clavien-Dindo classification), reintervention rate, stapler dysfunction rate, complications of nonfunctioning stoma, overall and cancer-specific quality of life (measured using short-form (36) questionnaire and quality-of-life (30) questionnaire core, respectively), fecal incontinence, and overall and cancer-specific quality of life.

Following the LAR, both patients will be tracked for a period of 12 months.

This is the first prospective randomized trial to look at the efficacy of 3-row staplers for colorectal anastomosis following rectal cancer surgery.

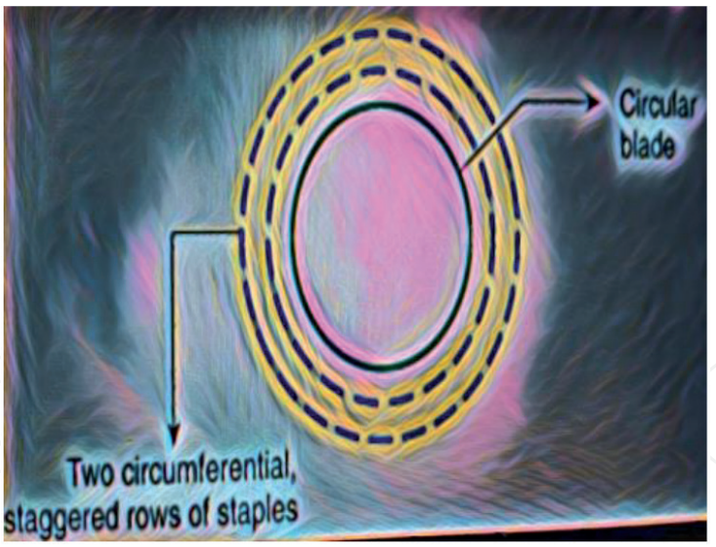

Figure 7.
2-row staple lines.

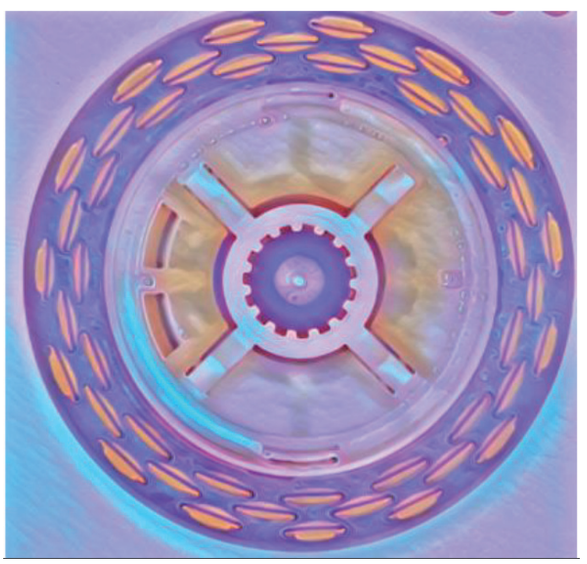

Figure 8.
3-row staple lines.

It could show that 3-row circular staplers are feasible in LAR in terms of short- and long-term patient outcomes (**Figures 7** and **8**).

3.3 MIS and colorectal anastomosis

A study performed by Jeong and coauthors [4] was assembled to report an institution's experiences with transanal total mesorectal excision (TME) of rectal cancer using single-port equipment and to discuss the feasibility and safety of the technique. In the institution mentioned, 10 patients (6:4) treated with transanal TME with colorectal anastomosis were examined (**Figure 9**).

In six of 10 patients, TME was done without the use of a laparoscope.

The average time spent on the operating table was 303.5 minutes.

The distal margin was 2.1 (0.2–4.2) cm on average.

The average number of lymph nodes harvested is 17.5.

Except for one patient who had an anastomotic leak, the majority of patients began dietary intake on POD 3 and were discharged on POD 7.

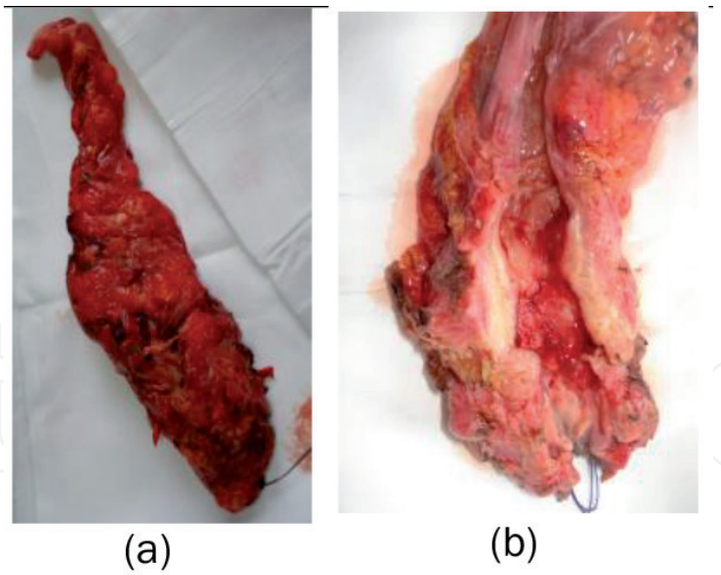

Figure 9.
Complete TME specimen (a) and sectioned (b) after abdomino-perineal resection with intact mesorectum.

The only postoperative complication was an anastomotic leak.

Conclusions: In selected cases of rectal cancer, pure natural orifice transluminal endoscopic surgery (NOTES) TME with coloanal anastomosis was found to be healthy and feasible.

4. Postoperative complications of colorectal anastomoses and their prevention

4.1 Anastomotic leakage

Anastomotic leak (AL) is a common problem in colorectal surgery, and its prevalence has remained steady in recent years.

The use of an intra-abdominal drain or mechanical bowel preparation to prevent AL has been shown to be ineffective and should be avoided.

The function of oral antibiotic preparation regimens should be explained and compared to other routes of administration, such as intravenous or enema, according to a study conducted by Meyer and coauthors [5].

Parallel to this, preoperative antibiotherapy should target pathogens that induce collagenase, as defined by the microbiome study.

Fluorescence angiography may minimize AL even further, resulting in major intraoperative improvements in surgical strategies.

Fluorescence angiography can be used more often.

There have been studies, such as the one by Gained and coauthors [6], that looked at the literature's connection between colorectal cancer recurrence, microbiome, and anastomotic leakage, and among the findings, one can find the aspect according to which the numerous mechanisms by which environmental factors act on the microbiome to alter its composition and function, with the net effect of adversely affecting oncological outcomes following surgery, are well documented and increasing.

Diet, antibiotic use, the procedures used to prepare the colon for surgery, and the physiological discomfort of the procedure are all examples of environmental causes.

Furthermore, using next-generation sequencing technologies to investigate the intestinal microbiome has the ability to affect cancer outcomes following colon

resection. In a systematic review that targeted the endoscopic management of early postoperative complications, a literature search was performed by Clifford and coauthors [7] for published full text articles using the PubMed, Cochrane, and Scopus databases using the search criteria string "colorectal anastomotic ("leak" or "bleed")," "endoscopy," and "endoscopic management." Endoscopic therapy in the management of stable patients with colorectal anastomotic leaks appears safe and is associated with the high rates of technical performance in selected patients, according to a review of 89 papers.

The most suitable method, patient selection, and considering the practical and long-term consequences of this approach remain challenging.

To fully assess the function of these novel strategies, further data from large prospective cohort studies are needed.

Shalaby and coauthors [8] conducted another systematic review on endoluminal vacuum-assisted therapy as a salvage treatment for rectal anastomotic leakage and found the following findings among 476 articles identified, 17 studies reporting on 276 patients:

The weighted mean success rate was 853% (95% confidence interval [CI]: 801–905), with a median time from the start of EVT to full healing of 47 (range 40–105) days.

The weighted mean rate of stoma reversal was 759% (646–872%) across the studies.

After EVT, twenty-five patients (91%) needed additional interventions.

Thirty-eight patients (138%) experienced complications as a result of the procedure.

The weighted mean complication rate was 111% (60–162%) across all tests.

Preoperative radiotherapy, the absence of a diverting stoma, complications, and male sex were all found to be significantly associated with failure.

According to the findings of the study, EVT is linked to a high rate of full healing of anastomotic leakage and stoma reversal.

In appropriately selected patients with anastomotic leakage, it is a viable choice.

Colorectal cancer surgery is thought to involve "high tie" and "low tie" of the inferior mesenteric artery (IMA).

However, the blood supply of the anastomosis is closely linked to the ligation stage, which can increase the leakage rate, and it is unclear which technique confers a lower anastomotic leakage rate (AL) and survival advantage.

The aim of the literature review, as stated by Yang and coauthors [9], was to compare the efficacy and impact of IMA high ligation versus IMA low ligation on anastomotic leakage, lymph node yield rates, and 5-year survival.

Finally, after reviewing studies from 1990 to 2017, researchers came to the conclusion that neither the high-tie nor the low-tie approach has any data in terms of anastomotic leakage, harvested lymph nodes, or 5-year survival rates.

More RCT is needed.

A study conducted by Simianu and coauthors [10] looked at the recency effect, which means that people place disproportionate emphasis on events that occurred recently when making decisions, but the magnitude of this influence on surgeons' decisions is uncertain.

The use of preventative leak testing before and after colorectal operations with anastomotic leaks is examined in this study to see whether there is a recency effect in surgeons.

A prospective cohort of adult patients (aged 18 years) undergoing elective colorectal surgery at Washington State hospitals participating in the Surgical Care and Outcomes Assessment Program was used to develop the materials and methods (2006–2013).

The key outcome measure was the difference in leak monitoring between 6 months before and 6 months after an anastomotic leak.

A leak rate of 2.6% (n = 124) was found in 4854 elective colorectal operations performed by 282 surgeons at 44 hospitals.

The anastomosis was not checked in 40 leaks (32%), which were spread through 25 surgeons.

While the small sample size restricted the ability to detect an overall difference in leak testing use, 9 (36%) of the 25 surgeons increased their leak testing by 5% or more after leaks in cases where the anastomosis was not checked.

The above facts led to the conclusion that only one-third of qualified surgeons demonstrated the recency effect.

Understanding the degree to which the recency effect influences clinical decisions may be useful in developing quality management strategies that involve clinician's behavior change.

Wang and colleagues [11] contrasted many aspects of robot-assisted versus laparoscopic surgery for rectal cancer by reviewing 20 studies with a total of 5496 patients, divided into a robot-assisted surgery group (n = 2168, 39.4%) and a laparoscopic surgery group (n = 3328, 60.6%).

Longer operating period (OR: 0.48, 95% CI: 0.14, 0.82), lower conversion to open surgery rate (OR: 0.55, 95% CI: 0.44, 0.69), shorter LOS (Length Of Stay) (OR: −0.15, 95% CI: −0.30, 0.00), faster bowel function recovery (OR: −0.38, 95%

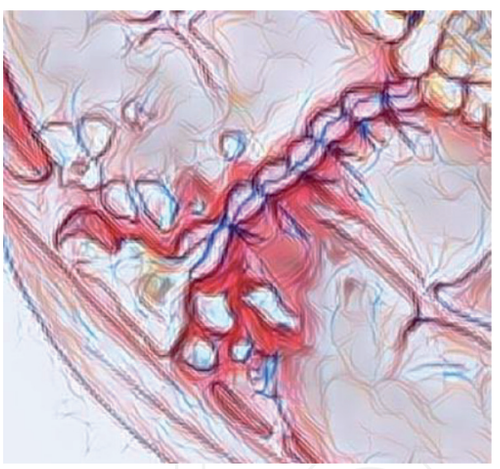

Figure 10.
Dehiscence at the level of the anastomosis.

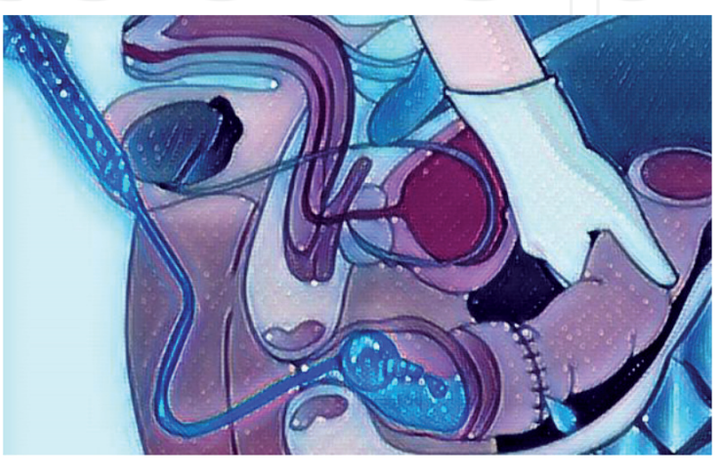

Figure 11.
Methylene blue test.

CI: −0.74, −0.02), and lower postoperative complications were all correlated with the robot-assisted surgery community (OR: 0.79, 95% CI: 0.65, 0.97).

There were no substantial differences between groups in EBL, anastomosis leak rate, or oncological outcomes such as the number of lymph nodes removed, the DRM, or the PCRM (**Figures 10** and **11**).

4.2 Postoperative ileus

Postoperative ileus generates a high impact on morbidity, hospital stay, and costs. Vergara Fernandez and coauthors [12] conducted a randomized controlled trial of 64 patients who had elective colorectal surgery with primary anastomosis in a tertiary referral center. Patients were divided into two groups: (i) those who chewed their gums (n = 32) and (ii) those who had a typical postoperative recovery (n = 32). Chewing gum after colorectal surgery was found to be associated with less postoperative ileus and vomiting, as well as improved flatus passage within the first 48 hours after surgery (**Figure 12**).

4.3 Anastomotic stenosis

It can sometimes be treated endoscopically, when surgery is contraindicated, by performing, as was found in a case report by Deng and team [13] with minimally invasive endoscopic approach was adopted to repair the obstruction. A needle knife was used to puncture the linear white scar, and contrast agent was injected under endoscopy and fluoroscopic guidance. Fluoroscopically, the proximal bowel was identified and a dual knife-mediated membrane puncture was performed. A guidewire was then passed through the incision into the proximal bowel and progressive pneumatic dilatation was performed successively with a controlled radial expansion balloon dilator until a 1.8-cm-diameter dilation was achieved. After conventional balloon dilatation, the endoscope easily passed through the anastomosis without any patient discomfort. There were no postoperative signs of immediate or delayed complications (**Figure 13**).

Figure 12.
Illustration of a simple abdominal X-ray exam in a patient with bowel obstruction.

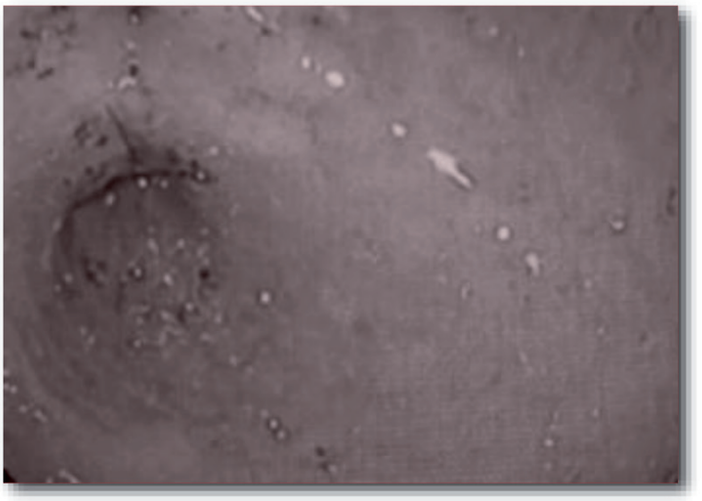

Figure 13.
Colonoscopic aspect of a anastomotic stenosis.

4.4 Anterior resection syndrome

Following TME, postoperative defecation dysfunctions known as "anterior resection syndrome" might appear.

Straight colorectal anastomosis (SCA), colon J-pouch (CJP), and side-to-end anastomosis are all common reconstruction techniques (SEA) (**Figures 14** and **15**).

There are no prospective, randomized, multi-center trials that compare their functional results, including long-term evaluations.

As a result, the primary endpoint of a study designed by Marti and collab [14] that included 336 patients from 15 hospitals who were randomized had a comparison of composite evacuation scores 12 months after TME as a primary endpoint.

Secondary endpoints included a comparison of composite evacuation and incontinence ratings at 6, 18, and 24 months after surgery, as well as morbidity and overall survival.

The study looked at the "per protocol" (PP) population, which complied with all-trial criteria, as well as the "intention-to-treat" (ITT) population.

At any time point, there were no statistically significant variations in the composite evacuation ratings of the PP and ITT populations.

Similarly, at any time point, there was no statistically significant difference in composite incontinence scores for the PP and ITT populations among the three trial weapons.

Conclusions: Within the scope of the investigation, surgeons in charge can continue to conduct intestinal continuity reconstruction following TME at their discretion.

In addition to the studies previously reported, Hou and collab [15] investigated whether the use of side-to-end anastomosis (SEA) in sphincter-preserving resection (SPR) is problematic and conducted a meta-analysis to compare the safety and efficacy of SEA with colonic J-pouch (CJP) anastomosis, which has been shown to improve postoperative bowel function.

The meta-analysis included a total of 864 patients from 10 RCTs.

At 12 months after SPR, patients who underwent SEA had a higher defecation frequency and a lower incidence of incomplete defecation than those who underwent CJP anastomosis with low heterogeneity and a lower incidence of incomplete defecation at 3 months after surgery.

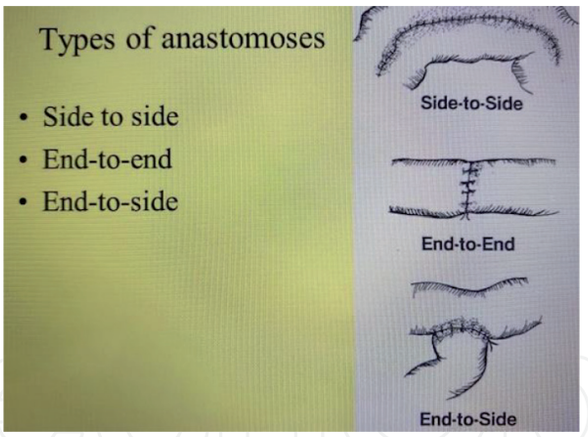

Figure 14.
Types of anastomoses illustrated.

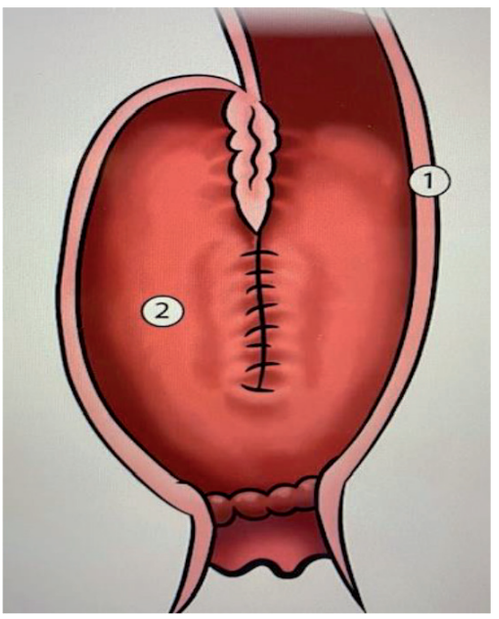

Figure 15.
Aspect of the J-pouch.

The SEA group also had a shorter operating period with no substantial heterogeneity.

The SEA group had a higher anorectal resting strain, but there was a lot of heterogeneity.

There were no significant differences between the groups in terms of efficacy outcomes such as defecation frequency, urgency, incomplete defecation, use of pads, enema, medications, anorectal squeeze pressure, and maximum rectal volume, or safety outcomes such as operating time, blood loss, use of protective stoma, postoperative complications, clinical outcomes, and complication rates.

In comparison with CJP anastomosis, the current evidence indicates that SEA is a successful anastomotic technique for achieving comparable postoperative bowel function without raising the risk of complications.

Shorter operating times, a lower occurrence of incomplete defecation three months after surgery, and improved sphincter function are all advantages of SEA.

However, after SPR, long-term defecation frequency should be closely monitored.

5. Intraoperative factors that interfere with the outcome of the anastomosis: testing methods of blood flow and patency at the level of the colorectal anastomosis

Assessing intraoperative perfusion with indocyanine green (ICG) and near-infrared (NIR) visualization can aid in selecting the degree of intestinal transection and subsequent anastomotic vascular sufficiency, according to the theory.

In a prospective study of nonselected patients undergoing any elective colorectal surgery with anastomosis in three tertiary hospitals over a 3-year span, NIR-ICG was used to look at anastomosis perfusion.

In addition to standard operator visual evaluation alone, a standard procedure was followed to evaluate NIR-ICG perfusion before and after anastomosis construction.

The researchers looked at 540 patients (median age 64 years, 279 men) who had surgery for neoplastic (330) and benign (174) pathology.

A total of 425 operations (853%) were initiated laparoscopically, with a 59% conversion rate.

In total, 220 patients (437%) had high anterior resection or reversal of Hartmann's procedure, and 90 patients (179%) had low anterior resection.

ICG angiography was effective in every patient, with leak rates of 24% (12 of 504) overall, 26% for colorectal anastomoses, and 3% for low anterior resection.

The anastomotic leak rates were lower when NIR-ICG imaging was used than in the participating centers from over 1000 related operations conducted with the same technique but without NIR-ICG technology. As a result, the study's findings were as follows:

Patients undergoing elective colorectal surgery should have their NIR-ICG levels checked on a regular basis.

The use of NIR-ICG can alter intraoperative decisions, potentially lowering anastomotic leak rates.

Kryzauskas conducted a systematic review and meta-analysis of publications, which included a total of 23 studies, with a total of 7115 patients, that were conducted to see whether intraoperative testing of the mechanical integrity and perfusion of the colorectal anastomosis could minimize the risk of AL. Intraoperative checks for the integrity (OR: 0.52, 95% CI: 0.34–0.82, P.001) and perfusion (OR: 0.40, 95% CI: 0.22–0.752, P.001) of the lower gastrointestinal tract anastomoses are linked to a substantially lower AL rate, according to a pooled study. The researchers came to the conclusion that intraoperative monitoring for anastomosis integrity or perfusion both reduced the AL dose. Studies combining these two anastomosis testing methods, especially intraoperative endoscopy and indocyanine green fluorescence angiography, could be very promising for further AL reduction. Since diabetes is a well-established independent factor that results in higher anastomotic leakage rates, the effects of biological sealants on colorectal anastomosis and their potential impact in patients with severe diabetes were studied in depth.

Fibrin sealants have been used to avoid anastomotic dehiscence in both laboratory and clinical trials.

We looked for existing evidence in the field by searching Medline (1966–2016) and Scopus (2004–2016). There is no evidence to support the use of fibrin sealants as a supplement in diabetic patients undergoing colorectal surgery at this time.

Experimental animal models with severe diabetes may be very useful in this area, and more research is required before fibrin sealants are used in a clinical environment.

In a systematic study and meta-analysis, Wu and team [16] analyzed the air leak test conducted intraoperatively.

The intraoperative air leak test (ALT) is a standard intraoperative test used to detect anastomosis that is mechanically inadequate.

The aim of this meta-analysis is to see whether ALT can help reduce postoperative colorectal anastomotic leakage (CAL).

The report included 22 experiments, with the following being the most notable.

According to the data, conducting an ALT using the recorded technique does not substantially reduce the clinical CAL rate, but it is still important due to the increased risk of CAL in ALT(+) cases.

Additional repairs, unfortunately, may not be successful in reducing this risk using current methods.

The findings of this study call for the standardization of ALT methodology and the creation of successful methods for repairing ALT(+) anastomoses.

A meta-analysis of randomized controlled trials on the use of suction drains following rectal surgery was conducted by Guerra and coauthors [17], and after looking at 760 patients from four RCTs that were eligible (RCT comparing drained with undrained anastomoses following rectal surgery), the use of drains showed little benefit in terms of anastomotic leak, pelvic complications, or reintervention.

On the other hand, the drained party had a slightly higher rate of postoperative bowel obstruction.

The researchers concluded that using pelvic drains routinely does not provide a major benefit in preventing postoperative complications following rectal surgery with extraperitoneal anastomosis.

Furthermore, a higher risk of bowel obstruction following surgery should be considered.

Non-surgery-based intraoperative risk factors for anastomotic healing also influence surgical outcome.

After analyzing 117 papers, a review by van Rooijen and team [18] provided an overview of potential modifiable risk factors that could play a role during the operation, and the results (the main outcome measure was the risk of anastomotic leakage and other postoperative complications during colorectal surgery) revealed that diabetes mellitus, hyperglycemia and a high HbA1c, anemia, and data on blood pressure, inotropes/vasopressors, oxygen supplementation, form of analgesia, and goal-directed fluid therapy are all unequivocal.

There was no research that looked into the effect of body core temperature or mean arterial pressure on CAL.

Subjective considerations including the surgeon's own evaluation of local perfusion and the visibility of the operating field have not been studied for incidence in CAL patients.

The findings revealed that in order to enhance colorectal treatment, both surgery-related and non-surgery-related risk factors that can be changed must be established.

In their ongoing attempt to minimize the number of CAL, surgeons and anesthesiologists can collaborate on these issues.

In the Netherlands, a multicenter cohort study is currently being conducted to determine individual intraoperative risk factors for CAL.

6. The anastomosis in an "emergency" setting, scared of a (potential) higher risk or do we still do the same?

In perforated diverticulitis, for example, there has been no consensus in the management, which is why the Shaban and coauthors [19] felt compelled to

perform a systematic review and meta-analysis, particularly because many surgeons choose the Hartmann's procedure to avoid the risk of an anastomotic leak.

As a result, we proposed that in certain patients, resection with primary anastomosis is a healthy option.

The study found 1933 abstracts, of which 14 trials (2 RCTs, 4 prospective non-randomized, and 8 retrospective non-randomized) with 765 patients met the inclusion criteria, with 482 in the Hartmann's group and 283 in the primary anastomosis group.

Primary anastomosis had a slightly lower mortality rate (10.6%) than Hartmann's (20.7%) ($p = 0.0003$).

The rate of morbidity was also lower (41.8 vs. 51.2%) ($p = 0.0483$).

Primary anastomosis had a risk ratio of 0.92 in favor of mortality ($p = 0.0019$).

The average rate of anastomotic leak was 5.9%.

Resection and primary anastomosis should be considered as a feasible and secure operative technique in selected patients with perforated diverticulitis, according to the findings of the study.

However, there is a scarcity of high-level data, and further research is needed.

Resection with primary anastomosis (PRA) with or without diverting ileostomy (DI), Hartmann's procedure (HP), laparoscopic lavage (LL), and damage control surgery were among the aspects reviewed in another and more complicated approach to damage control strategy in perforated diverticulitis with generalized peritonitis performed by Sohn and team [20] (DCS).

DCS is divided into two levels.

Limited resection of the diseased colon, oral and aboral closure, lavage, and vacuum-assisted abdominal closure are all options for emergency surgery.

After proper resuscitation, a second look operation is performed: definitive reconstruction with colorectal anastomosis (±DI) or HP.

The inclusion criteria were fulfilled by eight observational studies involving 256 patients.

There was no randomized study available.

Purulent peritonitis affected 67% of the patients, while feculent peritonitis affected 30%. Hinchey stage II diverticulitis was observed in 3% of the patients. The Mannheim peritonitis index (MPI) was greater than 26 in 49% of the cases. In 73% of cases, a colorectal anastomosis was developed during the second surgery. DI was used in 15% of the above group. HP was given to the remaining 27%. The postoperative mortality rate was 9%, and the morbidity rate was 31%. The rate of anastomotic leak was 13%. Without a stoma, 55% of patients were discharged.

Conclusions: DCS is a safe treatment for acute perforated diverticulitis with generalized peritonitis, with a high incidence of colorectal anastomosis and stoma-free hospital discharge in more than half of patients.

7. Long-term surveillance of the anastomosis

Pickhardt [21] compared the accuracy of CT colonography versus optical colonoscopy for neoplastic involvement at the surgical anastomosis 1 year after curative-intent colorectal cancer resection for neoplastic involvement at the surgical anastomosis.

As part of a prospective, multicenter study, 201 patients (mean age 58.6 years; 117 men, 84 women) underwent same-day contrast-enhanced CT colonography and colonoscopy approximately 1 year (mean, 12.1 months; median, 11.9 months) after colorectal cancer resection.

Many of the patients enrolled had no clinical signs of illness and were found to have a low risk of recurrence (stage I–III).

Relevant intraluminal anastomotic pathology tends to be very rare 1 year after colorectal cancer resection in lower-risk cohorts, according to the findings.

Diagnostic contrast-enhanced CT colonography, unlike colonoscopy, successfully measures both the intraluminal and extraluminal dimensions of the anastomosis.

Yang and collab [22] investigated the use of stents as a bridge to surgery in the treatment of acute left-sided obstructive colorectal cancer.

In a meta-analysis of randomized controlled trials, the factor according to which the trials were conducted was taken into account.

The use of self-expanding metallic stents (SEMS) as a bridge to surgery in the treatment of acute left-sided obstructive colorectal cancer has remained contentious.

The following were the outcomes:

We chose 8 RCTs papers with a total of 497 instances.

The stent group had significantly lower directly stoma rates, significantly higher active primary anastomosis rates, and significantly lower post-procedural complication rates.

The stent party, on the other hand, had substantially higher tumor recurrence rates, leading to the following conclusions:

This meta-analysis confirms that SEMS placement can lower the rate of direct stomas and increase the rate of active primary anastomosis; however, it is linked to a higher rate of tumor recurrence.

8. Conclusions

Laparoscopic anterior resection (LAR) is nowadays routine practice in specialized high-volume centers, with equivalent oncological outcomes to open surgery. Anastomotic leakage (AL) remains one of the most threatening complications in colorectal surgery with the incidence of up to 20%. Therefore, recognition of the risk factors of postoperative complications is essential in order to be prevented. Moreover, one must underline the importance of some risk factors such as age, nutrition status of the patient, experience of the surgeon, and many other factors that influence outcome of colorectal surgery. Some risk factors can be modified before the intervention to prevent postoperative complications. Contrary to that, long-term postoperative complications may promote tumor recurrence and decrease survival.

Conflict of interest

The author declares no conflict of interest.

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